REMARKS

THE AMENDMENTS

Applicants cancel all pending claims, claims 1 to 18, and add new claims 19-36. These new claims add no new subject matter, and are fully supported throughout the specification and by the drawings and claims as filed. Support and reasoning for the amendments are provided below.

Support for New Claims and Reasons for Amendments

These amendments are made to in order to expedite allowance of the present application. Applicants reserve the right to prosecute cancelled claims in this or other applications. These claims add no new subject matter and are fully supported throughout the specification, including the drawings and the claims as originally filed.

Support for new independent claim 19 can be found in the specification on page 33, lines 4-7:

> The present invention includes An integrated biochip system for the processing and analysis of a sample. By "integrated biochip system" is meant a system that: 1) comprises at leasst one chip, 2) is capable of performing at least two sequential tasks on a sample, wherein at least one task is a processing task.

Further, on page 36, line 27 to page 37, line 2, the specification states:

> Other preferred chips that find usefulness in the present invention are described in United States Application Number 09/678,263 (attorney docket number ARTLNCO.002A), entitled "Apparatus for Switching and Manipulating Particles and Methods of Use Thereof" filed on October 3, 2000 and United States Application Number 09/679,024 (having attorney docket number 471842000400), entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, also herein incorporated by reference.

Further disclosure of the multiple force chip is found on page 19 of the specification, lines 6-12:

> A "multiple force chip" or "multiforce chip" is a chip that generates physical force fields and that has at least two different types of built-in structures each of which is, in combination with an external power source, capable of generating one type of physical field. A full description of the

multiple force chip is provided in United States Application Number 09/679,024 having attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference in its entirety.

In a section on Single Chip Systems, the specification states (page 37, lines 15-26):

> In embodiments where a system of the present invention comprises a chip that has different functional elements, the regions of the chip having different functional elements can be in close proximity, such that sample components are freely and readily diffusible among the different functional elements (see, for example, **Figure 17**), and preferably but optionally, the different functional elements are at least partially interspersed with one another. Alternatively, in a multiple force chip, different functional elements, in particular different physical force-generating elements, can be provided in different structurally linked substrates that are vertically oriented with respect to one another. For examples of multiple force chips see United States Application Number 09/679,024 (having attorney docket number 471842000400), entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference.

In a section on Multiple Chip Systems, the specification states (page 40, lines 15-22):

> The multiple force chips described for the single-chip system and described in United States Application Number 09/679,024 (having attorney docket number 471842000400), entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference, can also find use in multiple chip systems of the present invention. For example, a multiple force chip can be used to separate components of a sample using dielectrophoretic and magnetic forces, and then the separated components can be directed to one or more other chips of the system for one or more analysis tasks.

New dependent claim 20, reciting a multiple force chip that comprises an electromagnetic element, finds support in U.S. Patent Application Number 09/679,024 (attorney docket number

471842000400, entitled "Apparatuses Containing Multiple Active /Force Generating Elements and Uses Thereof" filed October 4, 2000 , incorporated by reference. A multiple force chip that comprises an electromagnetic element is also depicted in Figures 1A, 1C, 1E, 6, and 14F of the present application, and described in the accompanying figure descriptions on pages 3, 4, 5, and 7.

New dependent claim 21, reciting a multiple force chip that comprises an acoustic element finds support in U.S. Patent Application Number 09/679,024 (attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active /Force Generating Elements and Uses Thereof" filed October 4, 2000 , incorporated by reference. A multiple force chip that comprises an acoustic element is also depicted in Figures 1F, 3, and 10 of the present application, and described in the accompanying figure descriptions on pages 3, 4, and 6.

New dependent claim 22, reciting a multiple force chip that comprises at least one electrode finds support in U.S. Patent Application Number 09/679,024 (attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active /Force Generating Elements and Uses Thereof" filed October 4, 2000 , incorporated by reference. A multiple force chip that comprises at least one electrode is also depicted in Figures 1A, 1C, 7A, 7B, 8, 12A, 12B, 14A, 14B, 15B, 15C, and 15D of the present application, and described in the accompanying figure descriptions on pages 3, 5, 6, 7, and 8.

New dependent claim 23, reciting a multiple force chip that comprises a traveling wave dielectrophoresis electrode array layer finds support in U.S. Patent Application Number 09/679,024 (attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active /Force Generating Elements and Uses Thereof" filed October 4, 2000 , incorporated by reference. A multiple force chip that comprises a traveling wave dielectrophoresis array layer is

also depicted in Figures 14A, 14B, 14D, and 15B of the present application, and described in the accompanying figure descriptions on pages 7 and 8.

New dependent claim 24, reciting a multiple force chip that comprises a particle switch layer finds support in U.S. Patent Application Number 09/679,024 (attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active /Force Generating Elements and Uses Thereof" filed October 4, 2000 , incorporated by reference. A multiple force chip that comprises a particle switch layer is also depicted in Figures 1A, 1B, 1D, 13A, and 13B of the present application, and described in the accompanying figure descriptions on pages 3 and 8.

New dependent claim 25, which recites an integrated biochip system that comprises a multiple force chip and further comprises a chamber, finds support on page 33 of the specification, lines 25 and 26: "A chip can be part of a chamber, can engage a chamber, or can be at least partially enclosed by a chamber, but this is not a requirement of the present invention." An integrated biochip system that comprises a multiple force chip and also comprises a chamber is also depicted in Figure 3,4, 5 (A-C), 6, 7(A and B), 8, 9 (A and B), 10, 11, and 12 (A and B).

New dependent claim 26 and new independent claim 27, in which one or more sample component can be moved from at least one area of at least one chip to at least one other area of the chip by traveling wave dielectrophoresis (Claim 26) or traveling wave magnetophoresis (Claim 27) find support on page 38 of the specification, lines 1-5:

> In preferred embodiments of the present invention, functional elements such as electrodes and electromagnetic units that are used in translocating a sample component from one area of a chip to another area of a chip are arranged such that they can generate traveling wave dielectrophoretic forces or traveling wave electromagnetic forces.

New dependent claim 28, in which sample applied to the integrated biochip system can remain continuously within the system from the beginning of the first of the sequential tasks until the end of the last of the sequential tasks performed by the integrated system finds support on

page 42 of the specification, lines 18-24:

> The inventors contemplate that in preferred embodiments of the present invention, an integrated system of the present invention can perform at least two sequential tasks in the processing and analysis of a sample while the sample remains continuously within the integrated system. That is, a sample applied to the integrated biochip system can remain continuously within said integrated system from the beginning of the first of the sequential tasks until the end of the last of the sequential tasks performed by the integrated system.

New dependent claim 29, in which the integrated biochip system is automated, finds support on page 43 of the specification, lines 3-6:

> In especially preferred embodiments, an integrated biochip system of the present invention is automated, such that the tasks are performed by the integrated system sequentially without manual intervention, such as, for example, transfer of sample or sample components from one chamber to another chamber.

New dependent claim 30, in which the integrated biochip system comprises at least two chips, finds support on page 39 of the specification, lines 2-3: "In one aspect of the present invention, an integrated biochip system comprises multiple chips."

New dependent claim 31, in which the two or more chips of the integrated biochip system are in fluid communication with one another, finds support on page 39 of the specification, lines 9-10: "In these aspects, preferably at least two chips are, for at least a portion of the time that the system is operating, in fluid communication with one another."

New dependent claim 32, in which sample components can be move from one chip to another chip of the integrated system using a mechanism other than fluid flow, finds support on page 12 of the application, lines 4-7:

Translocation of sample components from at least one chip of the integrated biochip system to at least one other chip of the integrated biochip system is preferably by a mechanism other than fluid flow, most preferably through the application of physical forces.

New dependent claim 33, in which sample components can be move from one chip to another chip of the integrated system using traveling wave dielectrophoresis or traveling wave magnetophoresis, finds support on page 40 of the application, lines 3-7:

In a multiple chip system, forces used to translocate sample components or microparticles from one chip of the system to another chip of the system can have one or more sources that are built onto or into a chip. Thus, active chips of the multiple chip system can be used for transporting sample components by, for example, traveling-wave dielectrophoresis or traveling-wave magnetophoresis for one chip to another chip.

New dependent claim 34, in which at least one chip of the integrated multiple biochip system is a passive chip, is supported on page 40, lines 3-5 : "A multiple chip system of the present invention can also optionally comprise one or more passive chips whose function does not require an applied physical force."

New dependent claim 35 is drawn to an integrated multiple biochip system that comprises at least two active chips. The definition of "active chip" is found on page 18 of the application:

An "active chip" is a chip that comprises micro-scale structures that are built into or onto a chip that when energized by an external power source can generate at least one physical force that can perform a processing step or task or an analysis step or task, such as, but not limited to, mixing, translocation, focusing, separation, concentration, capture, isolation, or enrichment. An active chip uses applied physical forces to promote, enhance, or facilitate desired biochemical reactions or processing steps or tasks or analysis steps or tasks. On an active chip, "applied physical forces" are physical forces that, when energy is provided by a power source that is external to an active chip, are generated by micro-scale structures built into or onto a chip.

An integrated multichip system having two or more active chips is supported on page 47, lines21-28 :

> In still another example, a system can produce magnetic forces and traveling wave dielectrophoretic forces sequentially on different chips. First, the magnetic force generating elements are turned on so that magnetic microbeads bound to a particular sample moiety experience magnetic forces for a specified length of time and are captured on one chip. The non-captured sample components are transferred to a second chip, where traveling wave dielectrophoretic force generating elements are turned on so that biological cells that are sample components experience traveling-wave dielectrophoretic forces.

New dependent claim 36, in which at least one chip of the integrated multiple biochip system is a particle switch chip, finds support in the passage on page 40, lines 7-14:

> The particle switch chip described in United States Application Number 09/678,263 (having attorney docket number ARTLNCO.002A), entitled "Apparatus for Switching and Manipulating Particles and Methods of Use Thereof" filed on October 3, 2000, herein incorporated by reference, can be used in this regard. Particle switch chips can also be used for translocating sample components from one area of a chip to another area of a chip in a multiple chip or single chip system, where different areas of a chip can have different functional elements for performing different tasks.

INFORMATION DISCLOSURE STATEMENT

Applicants confirm that an IDS was filed on Sep. 9, 2002 and entered. Applicants resubmit additional copies of the documents listed under "Other Documents" that are not found by the Examiner. For the convenience of the Examiner, Applicants also resubmit a listing of the provided reference on the enclosed Form 1449 and an Information Disclosure Statement referencing the references and Form 1449. No fee is deemed necessary for this filing of duplicate materials at the request of the USPTO.

CLAIMS DO NOT EXTEND THE "RIGHT TO EXCLUDE" UNDER THE DOUBLE PATENTING DOCTRINE

The Examiner alleges that claims 1-18, if allowed, would extend the "right to exclude" already granted in U.S. Patent No. 6,403,367. Applicants do not agree that the subject matter claimed in the present application is fully disclosed in the '367 patent. However, to expedite allowance of claims, Applicants have cancelled claims 1-18 and added new claims 19-36. New independent claim 19 recites an integrated biochip system that can perform two sequential tasks, one of which is a processing task, in which the integrated biochip system comprises a multiple force chip. New claims 20-36 directly or indirectly depend from claim 19. A multiple force chip is not taught or suggested in U.S. Patent No. 6,403,367. Multiple force chips comprise novel structural features over the chip described in '367, namely, different physical force elements incorporated onto a single chip, that allow separation methods or other functions that use different applied physical forces to be performed sequentially or simultaneously on a single chip. Disclosure of the multiple force chip is found on page 19 of the specification, lines 6-12:

> A "multiple force chip" or "multiforce chip" is a chip that generates physical force fields and that has at least two different types of built-in structures each of which is, in combination with an external power source, capable of generating one type of physical field. A full description of the multiple force chip is provided in United States Application Number 09/679,024 having attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference in its entirety.

Therefore, new claims 19-36 would not extend the "right to exclude" already granted in U.S. Patent No. 6,403,367. Applicants therefore request that the rejection be withdrawn.

CLAIMS ARE NOVEL UNDER 35 USC §102(E)

The Examiner alleges that claims 1-18 are anticipated under U.S.C. 102 (e) by Cheng et al. (US 6,403,637). Applicants have cancelled claims 1-18 and added new claims 19-36 that recite an integrated biochip system that can perform two sequential tasks, one of which is a processing task, in which the integrated biochip system comprises a multiple force chip. Disclosure of the multiple force chip is found on page 19 of the specification, lines 6-12:

> A "multiple force chip" or "multiforce chip" is a chip that generates physical force fields and that has at least two different types of built-in structures each of which is, in combination with an external power source, capable of generating one type of physical field. A full description of the multiple force chip is provided in United States Application Number 09/679,024 having attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference in its entirety.

Cheng et al. do not teach or suggest an integrated biochip system that comprises a multiple force chip. Accordingly Cheng et al. does not anticipate the claimed invention, and applicants respectfully request that the rejection be withdrawn.

CLAIMS ARE NOVEL UNDER 35 USC §102(G)

The Examiner alleges that claims 1-18 are anticipated under U.S.C. 102 (g) by Cheng et al. (US 6,403,637). Applicants have cancelled claims 1-18 and added new claims 19-36 that recite an integrated biochip system that can perform two sequential tasks, one of which is a processing task, in which the integrated biochip system comprises a multiple force chip. Cheng et al. do not teach or suggest an integrated biochip system that comprises a multiple force chip. Disclosure of the multiple force chip is found on page 19 of the specification, lines 6-12:

> A "multiple force chip" or "multiforce chip" is a chip that generates physical force fields and that has at least two different types of built-in structures each of which is, in combination with an

external power source, capable of generating one type of physical field. A full description of the multiple force chip is provided in United States Application Number 09/679,024 having attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference in its entirety.

Accordingly Cheng et al. does not anticipate the claimed invention, and applicants respectfully request that the rejection be withdrawn.

CLAIMS ARE NOVEL UNDER 35 USC §102(E)

The Examiner alleges that claims 1-8 and 18 are anticipated under U.S.C. 102 (e) by Austin et al. (US 6,203,683). Applicants have cancelled claims 1-18 and added new claims 19-36 that recite an integrated biochip system that can perform two sequential tasks, one of which is a processing task, in which the integrated biochip system comprises a multiple force chip. Austin et al. do not teach or suggest an integrated biochip system that comprises a multiple force chip. The Examiner provides a citation from Austin et al. from column 2, lines 57-60 of the '683 patent, reproduced here:

> Because the positioning, reactions, and release into a fractioning matrix all occur at the trapping electrode, which serves as a focusing wire, the need to transfer samples into different tubes is eliminated, thus increasing the efficiency and decreasing the possibility of damage to the samples.

This passage describes multiple *processes* that can occur at a single site on a microchip. It does not describe multiple different force-generating elements, which are present on a multiple force chip that is part of a device of the present invention. Rather, the passage discloses a single physical force-generating structure, namely, a trapping electrode. The microchip disclosed in column 2 of Austin et al. therefore does not constitute a multiple force chip as disclosed on page

19 of the present application, lines 6-12:

> A "multiple force chip" or "multiforce chip" is a chip that generates physical force fields and that has *at least two different types of built-in structures* each of which is, in combination with an external power source, capable of generating one type of physical field. A full description of the multiple force chip is provided in United States Application Number 09/679,024 having attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference in its entirety.
>
> [italics added]

Austin et al. does not disclose a multiple force chip as recited in new claim 19 and incorporated into dependent claims 20-35. Thus, Austin et al. does not anticipate the claimed invention, and applicants respectfully request that the rejection be withdrawn.

CLAIMS ARE NOVEL UNDER 35 USC §102(E)

The Examiner alleges that claims 1-8 and 18 are anticipated under U.S.C. 102 (e) by Blankenstein et al. (US 6,432,630). Applicants have cancelled claims 1-18 and added new claims 19-36 that recite an integrated biochip system that can perform two sequential tasks, one of which is a processing task, in which the integrated biochip system comprises a multiple force chip. Blankenstein et al. do not teach or suggest an integrated biochip system that comprises a multiple force chip. The Examiner provides a citation from Blankenstein et al. from column 2, lines 57-60 of the '683 patent, reproduced here:

> According to an important aspect of the invention, a new system for immunomagnetic cell separation and manipulation is provided that utilises a silicon base micro fabricated flow chip.

This passage from the '630 patent does not describe a chip having multiple different force-generating elements. Rather, the passage makes reference to a microfabricated chip that can be used in immunomagnetic cell separation and manipulation. The microfabricated chip disclosed in column 8 of Blankenstein et al. therefore does not constitute a multiple force chip as disclosed on page 19 of the present application, lines 6-12:

> A "multiple force chip" or "multiforce chip" is a chip that generates physical force fields and that has at least two different types of built-in structures each of which is, in combination with an external power source, capable of generating one type of physical field. A full description of the multiple force chip is provided in United States Application Number 09/679,024 having attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference in its entirety.

Blankenstein et al. does not disclose a multiple force chip as recited in new claim 19 and incorporated into dependent claims 20-36. Thus, Blankenstein et al. does not anticipate the claimed invention, and applicants respectfully request that the rejection be withdrawn.

CLAIMS ARE NONOBVIOUS UNDER 35 USC §103 (a)

The examiner alleges that claims 9-16, reciting an integrated biochip system that comprises two or more chips, are obvious under U.S.C. 103 (a) over Austin et al. (US 6,203,683). Applicants have cancelled claims 1-18 and added new claims 19-36 that recite an integrated biochip system that can perform two sequential tasks, one of which is a processing task, in which the integrated biochip system comprises a multiple force chip. New claims 30-36 are drawn to integrated biochip systems comprising two or more chips.

In rejecting claims 9-16, the Examiner has asserted that Austin et al. "disclose the invention substantially as claimed". Applicants disagree. In particular, Austin et al. do not teach or suggest an integrated biochip system that comprises a multiple force chip. The Examiner refers to Part 4 of the Office Action mailed Sep. 23, 2003, in which the Examiner has rejected claim 8 that recites a multiple force chip, referring to a citation from Austin et al. from column 2, lines 57-60 of the '683 patent, reproduced here:

> Because the positioning, reactions, and release into a fractioning matrix all occur at the trapping electrode, which serves as a focusing wire, the need to transfer samples into different tubes is eliminated, thus increasing the efficiency and decreasing the possibility of damage to the samples.

This passage describes multiple *processes* that can occur at a single site on a microchip. It does not describe or in any way suggest a multiple force chip having different force-generating *elements*. Rather, the passage discloses a single physical force-generating structure, namely, a trapping electrode. The processes described in column 2 of Austin et al. therefore do not constitute a multiple force chip as disclosed on page 19 of the present application, lines 6-12:

> A "multiple force chip" or "multiforce chip" is a chip that generates physical force fields and that has *at least two different types of built-in structures* each of which is, in combination with an external power source, capable of generating one type of physical field. A full description of the multiple force chip is provided in United States Application Number 09/679,024 having attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference in its entirety.

[italics added]

Austin et al. does not disclose or suggest an integrated biochip system having two or more chips, at least one of which is a multiple force chip as recited in new claim 30

and incorporated into dependent claims 20-36. A multiple force chip is also not a device available to those with routine skill in the art. Thus, Austin et al. does not render the claimed invention obvious, and applicants respectfully request that the rejection be withdrawn.

CLAIMS ARE NONOBVIOUS UNDER 35 USC §103 (a)

The examiner alleges that claims 9-16, reciting an integrated biochip system that comprises two or more chips, are obvious under U.S.C. 103 (a) over Blankenstein et al. (US 6,432,630). Applicants have cancelled claims 1-18 and added new claims 19-36 that recite an integrated biochip system that can perform two sequential tasks, one of which is a processing task, in which the integrated biochip system comprises a multiple force chip. New claims 30-36 are drawn to integrated biochip systems comprising two or more chips.

Applicants do not agree that Blankenstein et al. "disclose the invention substantially as claimed". In particular, Blankenstein et al. do not teach or suggest an integrated biochip system that comprises a multiple force chip. In Part 5 of the Office Action mailed Sep. 23, 2003, the Examiner rejects claim 8 that recites a multiple force chip, referring to a citation from Blankenstein et al. from column 8, lines 65-67 of the '630 patent, reproduced here:

> According to an important aspect of the invention, a new system for immunomagnetic cell separation and manipulation is provided that utilises a silicon base micro fabricated flow chip.

This passage from the '630 patent does not describe a chip having multiple different force-generating elements. Rather, the passage makes reference to a microfabricated chip that can be used in immunomagnetic cell separation and manipulation. The microfabricated chip disclosed in column 8 of Blankenstein et al. therefore does not constitute a multiple force chip as disclosed on

page 19 of the present application, lines 6-12:

> A "multiple force chip" or "multiforce chip" is a chip that generates physical force fields and that has at least two different types of built-in structures each of which is, in combination with an external power source, capable of generating one type of physical field. A full description of the multiple force chip is provided in United States Application Number 09/679,024 having attorney docket number 471842000400, entitled "Apparatuses Containing Multiple Active Force Generating Elements and Uses Thereof" filed October 4, 2000, herein incorporated by reference in its entirety.

Blankenstein et al. does not disclose or suggest an integrated biochip system having two or more chips, at least one of which is a multiple force chip as recited in new claim 30 and incorporated into dependent claims 20-36. A multiple force chip is also not a device available to those with routine skill in the art. a multiple force chip as recited in new claim 19 and incorporated into dependent claims 20-36. Thus, Blankenstein et al. does not render the claimed invention obvious, and applicants respectfully request that the rejection be withdrawn.

Applicants respectfully submit that the claims are ready for examination and in condition for allowance.

Respectfully submitted,

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In the event this paper is deemed not timely filed the applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to Deposit Account No.501321 along with any other additional fees which may be required with respect to this paper; any overpayment should be credited to the account. If any fees charged to this Deposit Account will exceed $500, applicant respectfully requests that its counsel be notified of such amounts before the Deposit Account is charged.